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AZALEA LANE AVONDALE INSTALLATION GUIDELINES

INSTALLER/OWNER RESPONSIBILITY

INSTALLER / OWNER RESPONSIBILITY—VERY IMPORTANT

INSTALLATION CONSTITUTES ACCEPTANCE of flooring material, subfloor/substrate, the jobsite itself including the ambient temperature and relative humidity at the time of installation, and all impacting variables that may affect a wood floor. It is the responsibility of both the installer and owner to inspect and approve each piece of flooring prior to installation. **IF THE FLOORING AS SUPPLIED WILL NOT SATISFY THE CUSTOMER IN FULL, DO NOT PROCEED TO INSTALL.** The decision not to proceed should be made within the first 10% or 100 square feet of flooring opened, whichever is less. Industry standards allow a variance from grading and manufacturing tolerances of 5%. For hold harmless agreements check with legal counsel. (refer to NWFA, Ch 1, Part 1, C.).

Many important decisions must be made at the installation site, and therefore must be the sole responsibility of the installer/owner. These include but are not limited to proper storage and handling, complete evaluation and permanent recording of site conditions including moisture testing of the subfloor and flooring, acclimation of flooring to appropriate conditions, subfloor preparation, flooring layout, milling, grade, color and gloss, scraping, proper installation methods, sufficient quantity on hand to complete the job, and jobsite cleanup.

[Brackets reference page #'s of additional information in the 2019 NWFA Installation Guidelines]

Introduction Every Azalea Lane Avondale engineered hardwood flooring installation must conform to all local building codes, ordinances, covenants, restrictions, trade practices, and climatic conditions.

Azalea Lane realizes professional installation assures the end user of a result that performs as well as they expect and adds value to their home. Azalea Lane recommends installation by NWFACP Certified Installers, and that the installation comply fully with these guidelines and current NWFA Installation Guidelines. Any discrepancies between these two guidelines, Azalea Lane guidelines supersede.

Health/Safety [NWFA, page 2-10]

- Before beginning any Azalea Lane installation, check OSHA requirements in your area at www.osha.gov. In addition to personal safety, compliance is required by law, and fines and or penalties for failure to comply can be severe.
- Personal Protective Equipment (PPE): Eye and Ear Protection are common concerns. Respirators specific to airborne hazards posed by wood dust and/or various finishes and solvents must also be considered.
- Federal, state, and local regulations impact working procedures and record keeping requirements on jobsites where materials such as asbestos, lead, formaldehyde, and crystalline silica dust are present. The installer is responsible for compliance with all such regulations.

Responsibilities of Involved Parties [NWFA, page 26-27]

- **Azalea Lane (manufacturer)** is responsible to produce a product that appears and performs as marketed based on applicable guidelines and warranties, produced and labeled in accordance with standards and regulations, and make available installation and maintenance instructions electronically (www.azalealaneflooring.com).
- The **Specifier** (where applicable) is responsible to ensure the product specified and jobsite conditions are compatible and will meet the end users requirements.
- The **Seller** (wholesaler/distributor, retailer) is primarily responsible to represent the product correctly in a good faith effort to meet the expectations of the end user. They must assure proper transportation, storage and handling during their possession of the product. Product should not be sold or delivered to a jobsite that does not meet the manufacturer and NWFA minimum requirements for jobsite conditions.
- The **builder/general contractor/end user** is responsible to provide jobsite conditions that meet or exceed the manufacturer and NWFA guidelines prior to wood flooring delivery and installation.
- The **Installer** is responsible to check jobsite conditions and confirm they meet/exceed manufacturer and NWFA guidelines. The Installer and End User must both ensure the product meets their expectations regarding appearance and quality prior to installation. The manufacturer recommends a trial lay out including product from several cartons and a review by the installer and end user prior to installation to assure success.

INSTALLATION CONSTITUTES ACCEPTANCE of the Azalea Lane Hardwood Flooring as delivered, and all site conditions including subfloor/substrate, moisture conditions, other site conditions, and any variables that may affect the wood floor immediately and in the future. Any decision not to proceed must occur within the first 10% or 100 square feet of flooring being installed, whichever is less. Industry standards allow a variance from grading and manufacturing specifications of up to 5% of the total job quantity. Azalea Lane must be notified, in writing, within 30 days of discovery of any easily ascertainable Azalea Lane flooring defect.

- The **End User** (homeowner) must maintain the flooring in accordance with the manufacturer floor care guidelines, including maintaining recommended temperature and relative humidity levels year round.

Jobsite Conditions [NWFA, page 28-37; also refer to the NWFA Jobsite Checklist document]

Wood Flooring professionals should understand climatic conditions applicable to the job location, and assure the space where flooring is to be installed will accommodate the manufacturer product and installation methods chosen.

Exterior Conditions:

Inspect the entire exterior of the structure; grade, drainage, landscaping, irrigation; any potential concerns that may affect the wood flooring installation. **Take/retain notes and photos**, and address any concerns with the end user and/or builder. **Exterior site/structure issues are NOT the responsibility of the flooring contractor/installer or the manufacturer, but wood flooring problems that result are often blamed on the installer who must then defend themselves.**

Interior Conditions:

- Wood flooring should be one of the last jobs completed in any remodel or new construction project.
- Do not deliver or install wood flooring until the structure is fully enclosed and protected from exterior weather conditions, and all “wet trades” (concrete, drywall, painting, tile, and any power washing) are completed.
- HVAC (permanent or temporary) must be operational and capable of maintaining conditions necessary for the Azalea Lane flooring being installed. These systems must be operational for a minimum of five days preceding delivery of the flooring, but longer HVAC operation may be required to reach the conditions required. These conditions should be achieved prior to delivery of the flooring, maintained during installation and in perpetuity thereafter. **(NOTE: Temporary propane heaters - torpedo heaters - produce large amounts of moisture and should be avoided.)**
- Test and document (photograph) temperature and relative humidity in each room receiving Azalea Lane Avondale flooring. A temperature range of 60-80f and r.h. of 30-50% is appropriate for most areas. [See NWFA Technical Publication C-300; Regional Climate Variations for additional information.]
- Never install a wood floor over a known moisture condition. Always test for moisture regardless of conditions to identify any hidden issues that may arise.

Acclimation/Conditioning:

- Only after the site conditions are confirmed suitable for wood flooring should the flooring be acclimated to those site conditions.
- Prior to delivery of the wood flooring, test and record the jobsite conditions and the subfloor moisture to ensure they are suitable for wood flooring delivery. Elevated readings must be resolved prior to delivery of any wood flooring.
- Upon delivery of the flooring to the site, again check and record the temperature and relative humidity in the space receiving the wood floor, these readings must be within the manufacturer’s requirements.
- Again check and record (photograph) the MC of the (wood) subfloor. Check a minimum of 20 locations for the first 1,000 square feet, and an additional 4 readings per 100 square feet thereafter, and average the results. Write test results directly on the subfloor at each location, including date, and photograph this notation. Test locations should be representative of the entire project and include a minimum of three tests per room receiving wood, with special attention to exterior walls and plumbing. In general, more readings will result in a more-accurate average. [Concrete subfloors, see “Substrates – Concrete”]
- Check and record (photograph) the MC of the flooring from throughout the shipment. Take readings of a minimum of 40 boards for the first 1,000 square feet, and an additional 4 readings per 100 square feet thereafter, and average the results. More readings will result in a more-accurate average.
- Any flooring with unusually high or low moisture readings should be isolated and not installed in the floor.
- The average of the wood subfloor readings should coincide with the manufacturer requirements. Any unusually high or low readings must be addressed prior to wood flooring installation.
- Ensure the MC of the wood subfloor is no more than 4% greater than the MC of Azalea Lane Avondale engineered flooring being installed. If moisture testing indicates flooring and subflooring are not sufficiently acclimated, more acclimation is required. Also, note engineered wood does not change moisture content and thus dimension uniformly. This may adversely affect the installation.
- Acclimation can be facilitated by separating the flooring into small lots and/or completely opening the packaging. Cross stack the materials with spacers (3/4” to 1” stickers) between each layer of flooring to allow air circulation on all sides until equilibrium has been reached.
- Concrete subfloors must be moisture tested, and adequate moisture control systems in place prior to installation of any Azalea Lane engineered wood floor.

- When the wood flooring is delivered at a MC that coincides with the expected in-use conditions, and coincides with the subfloor moisture conditions as tested, and these conditions will be maintained indefinitely, the flooring may be installed immediately.
Engineered flooring installed in a full spread adhesive may require some time to allow the adhesive to cure properly; follow adhesive manufacturer recommendations regarding covering the job, finishing, etc.
- **Record, date, photograph, and document all test results – protect your business.**

Moisture Testing Methods [NWFA page 38-44]:

- Understanding how to evaluate jobsite moisture and avoid or resolve any moisture related problems is critical to the success of every hardwood flooring installation.
- Test methods and equipment vary widely. Selection of both varies depending on the type of flooring and subflooring involved in a given job. Regardless, the installer must understand the equipment and test methods required to properly evaluate moisture on every hardwood-flooring job. The single biggest variable – operator error. The installer is responsible to test and record (photos) moisture conditions on every job.

Wood Moisture Testing: There are two basic electronic wood moisture meter types, pinless (dielectric) and pin (electrical resistance). Ideally, an installer should have understand how to use both. Readings from two meters are often helpful and may validate each other or, conversely, help resolve conflicting information.

Concrete Moisture Testing: Slab age does not mean moisture testing can be omitted – moisture testing is critical to assuring the success of every installation. Concrete moisture content must comply with the adhesive manufacturer’s requirements.

The current state of the art in concrete moisture testing is Relative Humidity testing via probes [ASTM F2170] inserted into holes drilled in the concrete. This is by far the most accurate method of determining moisture vapor emission rate. This method requires testing 3 locations for the first 1000 square feet of slab and 1 more for each 1000 square feet thereafter.

Electrical Moisture Meters [ASTM F2659] for concrete are good for preliminary evaluation of concrete slab moisture, but may not provide sufficient conclusive information for a “no/no go” decision. Typically, electrical meter testing requires 8 readings for the first 1000 square feet, and 5 readings for each 1000 square feet thereafter.

Calcium Chloride [ASTM 1869] is another common method of concrete moisture testing which provides a quantifiable moisture vapor emission rate.

Other concrete moisture test methods exist, but are far less common.

Basements and Crawlspaces:

- **Basement** conditions will change from season to season and may affect the flooring above. Finished basements are normally maintained similarly with the above living space, but be sure the end user understands how any changes will affect flooring above the basement. Treat any unfinished basement as unconditioned space.
- **Crawlspaces:** The distance from the earth to the underside of the floor joists must be a minimum of 18” and a minimum of 12” from the earth to the underside of beams. Crawl space ventilation is critical to avoiding crawl space related moisture issues. The minimum net area of ventilation openings is 1 square foot for each 150 square feet of under-floor space area; unless the ground surface is covered by a Class I vapor retarder material. Where a Class I vapor retarder material is used, the minimum net area of ventilation openings is 1 square foot for each 1,500 square feet of under-floor space area. One such ventilating opening shall be within 3 feet of each corner of the building.
Enclosed and Conditioned Crawlspaces: Crawl spaces may be enclosed and conditioned as detailed in IRC section R408.3, and the entire space is maintained at the same temperature and humidity levels as the above interior living space. These crawl spaces may result in a balanced condition below and above the flooring system. [See NWFA 2019 Installation Guidelines, page 47].

Substrates - Wood [NWFA 48-60]:

- **Wood Subfloors:** Wood flooring is not intended to add structural strength or stiffness to a subfloor; the wood flooring installation is only as good as the subfloor beneath it. The installer/flooring contractor is NOT responsible for the design or installation of the subflooring/structure unless qualified and otherwise contracted. If a subfloor/structure is deemed by the flooring installer/flooring contractor as not suitable, the installer is responsible to notify the builder/owner prior to installation so any deficiencies can be remedied.
- **NOTE:** Azalea Lane's Avondale engineered flooring is a "thinner-profile" product [NWFA definition] requiring a stiffer wood subfloor system than required for ¾" solid flooring. The manufacturer therefore recommends a double layer subfloor system to assure adequate structural soundness.
- **Plywood subfloor panels** should conform to the most-current U.S. Voluntary Product Standard PS 1 performance standard on the date it was manufactured.
- **Oriented strand board (OSB) subfloor panels** should conform to the governing version U.S. Voluntary PS 2 on the date it was manufactured.
- **Single layer subfloor panels** should be installed continuous over two or more spans, with the long panel dimension (strength axis) perpendicular to floor trusses or joists. All panel edges not supported continuously with framing shall be tongue and groove. To minimize the potential for floor squeaks, all subfloor panels should be glued and nailed or screwed to the floor framing using recommended fasteners and subfloor adhesives conforming to ASTM D3498 or APA Specification AFG-01. The ends of the panels must land at the center of the floor joist/truss, with a minimum bearing of 1/2". Fasten with 6d ring- or screw-shank nails, 8d common nails, or proprietary screws spaced 12" O.C. along panel edges and 12" O.C. along intermediate supports. Leave a 1/8" gap around the perimeter (all four sides) of each panel.

Joist spacing	Minimum Subfloor Required
16" o.c. or less	19/32" plywood or 23/32" OSB
Greater than 16" – 19.2"	23/32" plywood or OSB
Greater than 19.2" – 24"	7/8" plywood or OSB
Greater than 24" – 32"	1-1/8" plywood or OSB

- **Double-Layer Subfloor Systems [recommended]** should consist of two layers of either plywood or OSB, compliant with the same specs as single layer structural panels. A double layer may be required where the existing/base layer and structure do not meet NWFA minimum guidelines. Both layers must be fully acclimated (see acclimation section), and gapping and fastening requirements remain as for single layer subfloors. The "top" layer should be a minimum 15/32" thickness. A second layer should be oriented perpendicular to the floor framing and offset from the long axis of the base layer by a minimum of 4" and end joints by a minimum of one joist spacing; edges of both layers should never be aligned. This top layer may alternately be installed diagonal to the base layer. No base vs. top seams should align. 1/16" to 1/8" gap must be left around each panel and ¼" gap at all vertical obstructions. Fastening schedule should be the same as for single layer subfloors. If the existing base layer is particleboard or solid boards, removal is not an option, and the subfloor does not meet NWFA minimum guidelines, the top layer should be a minimum 19/32" thick; otherwise, the same joint stagger and fastening guidelines apply.
- Solid board subfloors should be "1x6" nominal dimension, installed 45 degrees to the joists, and structurally sound. All end joints require full bearing on a joist, fastened with a minimum 8d rosin-coated or ring shank nails or equivalent. When installing Azalea Lane Avondale engineered flooring over a solid board subfloor, a "double layer" subfloor system will be necessary to avoid gapping due to subfloor movement (see preceding section)
- Particleboard is not a suitable substrate for any mechanically fastened or "glue-assisted" nail down Azalea Lane Avondale hardwood flooring installation. If the installation is to be mechanically fastened, particleboard must either be removed, or may be over laid with minimum 19/32" plywood or OSB.
- Glue down installation of Azalea Lane's Avondale engineered hardwood flooring over particleboard may be possible – check with the adhesive manufacturer for details.
- Floating installation of Azalea Lane Avondale flooring is approved over particleboard.

Wood subfloors - conditions required:

- Subfloors must be **structurally sound**. Address any movement, delamination, squeaks/noise, water damage, physical damage, etc. with the homeowner, builder, or other responsible party prior to installation. Protruding or loose fasteners, squeaks/noises, etc. may be resolved by the installer, while some issues are not an installer's responsibility and may not be within a flooring installer's capability. Document any such conditions with notes in the job file including photographs.
- Subfloors must be **flat**. Subfloor flatness is not the same as "level". Level is typically not necessary, but reasonably flat is very important. For installation with mechanical fasteners at least 1 1/2" long, the subfloor must be flat within 1/4" in 10' or 3/16" in 6'. For all other installations (shorter fasteners, glue down, or floating), the subfloor must be flat within 1/8" in 6', or 3/16" in 10'. There are various means of correcting subfloor flatness; for more information see NWFA Installation Guidelines, page 58-59.
- Subfloors must be **dry**. The builder is responsible to control moisture during the building process. The installer must confirm subfloor moisture conditions are suitable before installing any hardwood floor. Any damage due to moisture exposure (swelling, distortion, etc.) prior to flooring installation must be resolved before proceeding with any Azalea Lane Avondale flooring installation.
- Subfloors must be **clean**. Remove any debris present, and address any contamination that may compromise the installation.

SUBSTRATES – Concrete [NWFA Page 61-86]:

- Concrete slabs should be a MINIMUM of 30-45 days old before evaluating the slab for Azalea Lane Avondale flooring. [THIS DOES NOT MEAN ANY SLAB 30 DAYS OLD IS READY FOR FLOORING INSTALLATION]. A concrete slab on grade (poured directly on soil/ground) must have a Class I vapor retarder installed directly below the slab.
- 3000 PSI [tested by ASTM C39] is the minimum required compressive strength for concrete slabs for direct glue-down Azalea Lane Avondale hardwood installations, or mechanically anchored wood panel subfloors.
- Lightweight concrete is not suitable for direct glue-down of Azalea Lane Avondale solid hardwood flooring.
- Subfloor Toppings may be used to flatten or smooth concrete, but must be compatible with the adhesive chosen and meet 3000 psi, same as the base slab itself. Topping must also be completely dry before Azalea Lane hardwood flooring installation.
- Concrete subfloors must be structurally sound, free of hollow spots, voids, loose/crumbling residue, or stress cracks. Document slab conditions including photos and notes in the job file.
- The concrete surface over which Azalea Lane hardwood flooring is being installed (direct glue-down) must be compatible with the adhesive chosen. That includes:
 - Free of any contaminants that may compromise adhesive bond. This includes old adhesive residue, curing compounds, waxes, oils, paint, dust, drywall compound, etc. [OLD RESILIENT FLOORING AND ADHESIVE RESIDUE MAY CONTAIN ASBESTOS – DO NOT DISTURB ASBESTOS].
 - pH of concrete may affect adhesive performance; check with the adhesive manufacturer for acceptable pH levels.
 - Surface porosity is critical to the performance of any adhesive; follow adhesive manufacturer recommendations for appropriate CSP ratings.
 - Concrete slabs must be flat within 3/16" in 10' or 1/8" in 6'.

Wood Subflooring Installed Over Concrete [NWFA Page 76-86]:

- Wood subfloor panels over concrete slabs may be single or double layer.

- Wood subflooring may be mechanically fastened, full spread glue-down, or floated.
- All concrete conditions as previously defined above must be met.
- Wood panels must be properly acclimated and meet the same standards as previously defined under Substrates – Wood. If using pressure treated panels, they must be kiln dried after treatment and fully acclimated to site conditions.
- A Class-I impermeable vapor barrier is strongly recommended.
- Various fastening methods apply

Substrates - Radiant Heat [NWFA Page 87-101]:

- Azalea Lane's Avondale engineered flooring is suitable for use over many in-floor radiant heat systems (hydronic or electric). The coordination of a specific in-floor radiant heat system in a given home's heating requirements for compatibility with Azalea Lane's Avondale engineered flooring is the responsibility of the specifier/architect, builder, flooring supplier, flooring installer, and end user. All of this is outside Somerset's control and therefore cannot be Somerset's responsibility.
- **Wood flooring is sensitive to temperature and moisture change, thus it is imperative that any in-floor radiant heating system limit wood flooring surface temperature to a maximum of 80 degrees f, and maintain a minimum relative humidity in the hardwood flooring itself of 30%.**
- **Choosing a more sensitive wood species (hickory and maple) may require maintaining closer tolerances of temperature and relative humidity levels to avoid flooring damage. Any moisture related flooring issues are excluded in the manufacturer limited warranty document.**
- Wood flooring surface temperature should vary no more than 3 degrees f at any point within the installed wood floor.
- Wood flooring temperature should not fluctuate by more than 5 degrees f per day. Outdoor reset controls and an in-floor sensor should be installed to minimize rapid temperature changes.
- Area rugs, pet beds, exercise mats, or other similar products trap heat where they rest on hardwood flooring, potentially resulting in flooring damage. This situation should be avoided.
- All radiant heating systems should be fully operational, regardless of season, for a minimum of five days prior to delivery of wood flooring. Radiant heating must then be turned off during installation.
- In floor temperature and humidity monitoring (data-loggers) are strongly recommended to monitor flooring conditions indefinitely.
- Fastening of Azalea Lane Avondale engineered hardwood flooring over in-floor radiant heat systems must never compromise either hydronic tubes or electronic heating elements.
- Radiant cooling systems are never recommended under Azalea Lane Avondale hardwood flooring.
- The end-user must have a clear understanding of their flooring product, radiant heat system, and how the two interact in order to maintain both for successful performance.
- THE MANUFACTURER WILL STRICTLY ENFORCE APPLICABLE NWFA GUIDELINES [2019 EDITION] REGARDING INSTALLATIONS OF AZALEA LANE'S AVONDALE FLOORING OVER ANY IN-FLOOR RADIANT HEAT SYSTEM.

Substrates – Existing Flooring [NWFA Page 102-105]:

- Installing hardwood flooring parallel to an existing solid nailed down wood floor will require an overlay of a minimum 11/32" panel subfloor (see double layer subfloors section). Any new subflooring and the old flooring under it must be fully acclimated (see acclimation section).
- New flooring may be installed (nail or glue down) directly over existing wood flooring if installed perpendicular or at least a 45 degree angle to the existing floor.
- Existing Vinyl, Resilient, Cork, Linoleum floors may be installed over if they are well bonded to the subfloor, flat (1/8" in 6'), clean, and no more than two layers thick. Fasteners must penetrate the subfloor by a minimum of 5/8". Any glue down installation requires checking compatibility of the adhesive with the existing flooring.
- Existing Ceramic, Terrazzo, Slate, and Marble may be installed over using glue down methods only. Refer to the concrete subfloors section for more information. Many such substrates will require abrasion to create a good bond for the adhesive.
- Carpet: Never install hardwood flooring over carpet or carpet pad.

Underlayments – Moisture Control [NWFA Page 106-109]:

When installing over a wood subfloor, always identify if the space below the flooring is conditioned (heated/cooled and humidified/dehumidified) or unconditioned space (not directly heated/cooled or humidified/dehumidified).

- No vapor retarder is necessary under the new wood floor when installed over a **conditioned** space maintained at the same temperature and humidity as the living space directly above. No vapor retarder should be installed under the wood floor if a Class I or Class II vapor retarder exists on the underside of the joists.
- A Class II vapor retarder should be used on wood subfloors over **unconditioned** spaces. **IMPORTANT:** Never use a vapor retarder to remedy a known moisture condition, and never install a wood floor over a known moisture condition.
- When installing over a concrete subfloor, a Class I impermeable vapor retarder is always recommended, whether installing the wood flooring directly on the concrete, installing a wood subfloor on the concrete, or installing over existing flooring [existing vinyl, resilient, linoleum, or cork flooring may not require a vapor retarder be installed.]
- Sound Control/Acoustical Underlayments [See NWFA – Page 110 for details]

Layout [NWFA 2019 Installation Guidelines, Page 116-120]:

- Hardwood flooring is typically installed parallel to the length of the room, but always install perpendicular to the floor joists unless special subfloor conditions are met (see installation section). A primary line should be established as the longest, straightest, continuous line on the job, and all other working lines based off the primary line so the job flows well and is visually “balanced” in the space.

INSTALLATION METHODS [NWFA 2019 Installation Guidelines, Page 121-144]:

- **Nail Down**
- The flooring must be installed perpendicular (45 degree angle or greater) to the floor joists, unless special subfloor requirements are met.
- When installing parallel to joists it is critical to confirm adequate subfloor thickness. Typically add a second layer of minimum 15/32” plywood underlayment to the existing subfloor (refer to double-layer subfloor systems for more detailed information.) Another option is to brace between joists/floor trusses. This should be completed by a qualified professional.
- **Fasteners**
- Blind nail using cleats (flooring nails) or narrow crown (1/4”) staples, either 18 or 20 gauge depending on the tool; minimum 1 ¼”. Fasten on 3” – 4” intervals, 1”-2” from each end joint, minimum 2 fasteners per board. Blind fasteners should be seated flush in the nail pocket, not too deep.
- For face nailing (near walls and obstacles to blind nailing), use casing or finish nails, minimum 18 gauge. For plank floors face nail on 8” to 10” intervals; for strip flooring face nail on 10”-12” intervals. Fill face nail holes with matching wood filler.
- Elastomeric adhesive may be used as an alternative or addition to the use of face nails where required [see “glue assist” section for more details].
- Fastening at intervals less than required are acceptable as long as the tongue and core of the flooring is not compromised or split by the fasteners.
- Remove existing base/shoe, thresholds, etc. Undercut doorjamb and casings.
- Maintain 1/2” expansion space at all vertical obstructions. If the floor span (perpendicular to grain) is greater than 20’, field expansion space may be required [see NWFA guidelines page 128 for further information].
- Install a vapor retarder/underlayment as necessary.
- Racking prior to installation, work from multiple bundles or cartons to achieve satisfactory assortment of color variation, lengths, etc. Distribute lengths to avoid patterns such as stair-steps or H- joints. Cutting varied starter board lengths will assist in “randomizing” joints. In general, end-joint stagger from row-to-row should be a minimum of twice the width of the flooring (ie: 6” stagger for 3” wide material). Wider-width materials may be more difficult to stagger joints due to product length limitations.
- Fasten a starter row along the entire length of the primary working line. Installed wood flooring should not deviate from a straight line more than 3/16” in 10’. Use spline (aka “slip-tongue) anytime the flooring direction changes, at all headers or flush transitions, and when reversing installation direction such as starting in the center of a layout or back-filling.
- Glue Assisted Nail Down [fasteners AND adhesive combined]
- The manufacturer recommends this method when installing all products 5” and wider.



- **A traditional sheet-good vapor retarder must be omitted. However, proper and stable site moisture conditions remain important. Glue assisted nail down installations remain subject to moisture issues.**
- Where wood flooring is being installed over unconditioned space, use of a liquid-applied or similar Class II vapor retarder compatible with the flooring adhesive may be used in a glue-assist directly to the subfloor.
 - The nailing schedule should remain the same as normal installation for the flooring being installed. The addition of adhesive is not intended as a replacement fastener mechanism, rather supplemental to the mechanical fastener.
 - The wood flooring adhesive used should be elastomeric to allow for normal movement of the flooring system. The adhesive must be compatible with the subflooring and any liquid-applied or similar vapor retarder system used.
 - Adhesive may be applied to the subfloor or back of the board to supplement the mechanical fasteners. Adhesive should cover the entire width and length of each plank, to within a minimum of 1" from the edges and ends of each board. Serpentine and striped patterns are acceptable.
- Full Spread Glue Down [wood or concrete subfloors]:
 - The flooring must be installed perpendicular (45 degree angle or greater) to the floor joists, unless special subfloor requirements are met.
 - When installing parallel to joists it is critical to confirm adequate subfloor thickness. Typically add a second layer of minimum 15/32" plywood underlayment to the existing subfloor (refer to double-layer subfloor systems for more detailed information.) Another option is to brace between joists/floor trusses. This should be completed by a qualified professional.
 - Concrete subfloors (refer to the Concrete Subfloors chapter for more-detailed information).
 - **A traditional sheet-good vapor retarder must be omitted [except acoustical underlayment systems]. However, proper and stable site moisture conditions remain important. Glue down installations remain subject to moisture issues.**
 - Where wood flooring is being installed over unconditioned space, use of a liquid-applied or similar Class II vapor retarder compatible with the flooring adhesive may be used in a glue-down installation.
 - The manufacturer recommends a quality hardwood flooring adhesive. Follow the adhesive manufacturer's instructions for proper use of the adhesive, application methods, flash-time, working-time, etc. All wood flooring adhesives must be elastomeric and remain flexible despite movement in the installed flooring system.
 - Expansion space, racking, joint spacing, etc. remain the same as recommended for nail down installations.
- Floating Floors [wood or concrete subfloors]:
 - The flooring must be installed perpendicular (45 degree angle or greater) to the floor joists, unless special subfloor requirements are met.
 - When installing parallel to joists it is critical to confirm adequate subfloor thickness. Typically add a second layer of minimum 15/32" plywood underlayment to the existing subfloor (refer to double-layer subfloor systems for more detailed information.) Another option is to brace between joists/floor trusses. This should be completed by a qualified professional.
 - When floating Azalea Lane's Avondale engineered flooring, subfloor flatness is particularly important. All subfloors should be flat to within 1/8" in 6' or 3/16" in 10'.
 - Moisture testing remains important to avoid trapping moisture beneath floating floor underlayments, and to avoid excessive movement of the floating floor. Do not assume floating a floor negates the need for moisture testing.
 - The flooring should be floated only over a quality floating floor underlayment specified by the manufacturer of the underlayment as suitable for use with 1/2" hardwood flooring. Over concrete subfloors, that underlayment should include a Class I vapor retarder, or a separate Class I vapor retarder should be applied. Over wood substrates above unconditioned spaces, use an underlayment that includes a Class II vapor retarder, or provide one separately.
 - Expansion space is particularly critical with any floating floor. 1/2" expansion space is required at all vertical obstructions. Be particularly careful to allow adequate expansion at all door jambs/casings, thresholds, etc.
 - Expansion space is also required (covered with transition moldings) thru doorways less than 4' in width, and within any room/space greater than 20' in width or 40' in length (as related to the flooring direction).
 - Floating floor installations must be free to float without interference from trim, kitchen islands, cabinets, etc. Never fasten anything thru a floating floor into the subfloor, or directly to the floating floor.
 - Azalea Lane's Avondale engineered hardwood flooring must be edge-glued – **THIS IS NOT A LOCKING TONGUE GROOVE PRODUCT.**



- Apply a small bead of PVA or equivalent glue continually along the edge and end groove, directing the bead of glue to the bottom of the floor (unfinished face). Too much glue is NOT better, as it may result in bleed back onto the flooring surface, and may fill the groove such that the tongue cannot fully seat in the groove (like a hydraulic cylinder – compressing the glue creates pressure resulting in gaps). Glue application takes some practice to get a “feel” for the quantity to apply.
- Engage the tongue/groove and use a tapping block to close the joints. Straps, wedges, clamps, etc. may help to hold the rack together during the work. It is important to start the job working against a fastened “starter row” that remains stationary as the flooring is being racked out and tapped together. Once a substantial portion of flooring is in place and glue has had a chance to develop strength, the starter row can be removed.
- Clean any excess glue from the surface of the planks as necessary.

Protection, Care, and Maintenance [NWFA page 150-152]

- After installation, if a protective cover over the floor is needed, cover the floor completely. Areas left uncovered may change color. Also note covering a glue-down or glue assisted application may not allow some adhesives to properly cure; follow the adhesive manufacturers’ recommendations. Any adverse effects of covering any Azalea Lane Avondale floor after installation are excluded by the manufacturer limited warranty.
- Any protective covering should be taped, using a low-adhesion tape, to base or shoe moldings. **NEVER** apply tape to the finished flooring. When taping paper or sheets together, tape them to each other, not to the floor. Do not allow the floor covering to sit on the installed floor for an extended period of time.

[Brackets reference page #'s of additional information in the 2019 NWFA Installation Guidelines]

Introduction Every Azalea Lane Avondale solid hardwood flooring installation must conform to all local building codes, ordinances, covenants, restrictions, trade practices, and climatic conditions.

Azalea Lane realizes professional installation assures the end user of a result that performs as well as they expect and adds value to their home. Azalea Lane recommends installation by NWFA Certified Installers, and that the installation comply fully with these guidelines and current NWFA Installation Guidelines. Any discrepancies between these two guidelines, Azalea Lane guidelines supersede.

Health/Safety [NWFA, page 2-10]

- Before beginning any Azalea Lane installation, check OSHA requirements in your area at www.osha.gov. In addition to personal safety, compliance is required by law, and fines and or penalties for failure to comply can be severe.
 - Personal Protective Equipment (PPE): Eye and Ear Protection are common concerns. Respirators specific to airborne hazards posed by wood dust and/or various finishes and solvents must also be considered.
- Federal, state, and local regulations impact working procedures and record keeping requirements on jobsites where materials such as asbestos, lead, formaldehyde, and crystalline silica dust are present. The installer is responsible for compliance with all such regulations.

Involved Parties [NWFA, page 26-27]

- Azalea Lane (manufacturer) is responsible to produce a product that appears and performs as marketed based on applicable guidelines and warranties, produced and labeled in accordance with standards and regulations, and make available installation and maintenance instructions electronically (www.azalealane flooring.com)
- The **Specifier** (where applicable) is responsible to ensure the product specified and jobsite conditions are compatible and will meet the end users requirements.
- The **Seller** (wholesaler/distributor, retailer) is primarily responsible to represent the product correctly in a good faith effort to meet the expectations of the end user. They must assure proper transportation, storage and handling during their possession of the product. Product should not be sold or delivered to a jobsite that does not meet the manufacturer and NWFA minimum requirements for jobsite conditions.
- The **builder/general contractor/end user** is responsible to provide jobsite conditions that meet or exceed the manufacturer and NWFA guidelines prior to wood flooring delivery and installation.
- The **Installer** is responsible to check jobsite conditions and confirm they meet/exceed manufacturer and NWFA guidelines. The Installer and End User must both ensure the product meets their expectations regarding appearance and quality prior to installation. The manufacturer recommends a trial lay out including product from several cartons and a review by the installer and end user prior to installation to assure success.

INSTALLATION CONSTITUTES ACCEPTANCE of the Azalea Lane Hardwood Flooring as delivered, and all site conditions including subfloor/substrate, moisture conditions, other site conditions, and any variables that may affect the wood floor immediately and in the future. Any decision not to proceed must occur within the first 10% or 100 square feet of flooring being installed, whichever is less. Industry standards allow a variance from grading and manufacturing specifications of up to 5% of the total job quantity. **Azalea Lane must be notified, in writing, within 30 days of discovery of any easily ascertainable Azalea Lane flooring defect.**

- The **End User** (homeowner) must maintain the flooring in accordance with the manufacturer floor care guidelines, including maintaining recommended temperature and relative humidity levels year round.

Jobsite Conditions [NWFA, page 28-37; also refer to the NWFA Jobsite Checklist document]

Wood Flooring professionals should understand climatic conditions applicable to the job location, and assure the space where flooring is to be installed will accommodate the manufacturer product and installation methods chosen.

Exterior Conditions:

Inspect the entire exterior of the structure; grade, drainage, landscaping, irrigation; any potential concerns that may affect the wood flooring installation. **Take/retain notes and photos**, and address any concerns with the end user and/or builder. **Exterior site/structure issues are NOT the responsibility of the flooring contractor/installer or the manufacturer, but wood flooring problems that result are often blamed on the installer who must then defend themselves.**

Interior Conditions:

- Wood flooring should be one of the last jobs completed in any remodel or new construction project.
- Do not deliver or install wood flooring until the structure is fully enclosed and protected from exterior weather conditions, and all “wet trades” (concrete, drywall, painting, tile, and any power washing) are completed.
- HVAC (permanent or temporary) must be operational and capable of maintaining conditions necessary for the Azalea Lane flooring being installed. These systems must be operational for a minimum of five days preceding delivery of the flooring, but longer HVAC operation may be required to reach the conditions required. These conditions should be achieved prior to delivery of the flooring, maintained during installation and in perpetuity thereafter. (**NOTE:** Temporary propane heaters - torpedo heaters - produce large amounts of moisture and should be avoided.)
- Test and document (photograph) temperature and relative humidity in each room receiving Azalea Lane's Avondale flooring. A temperature range of 60-80f and r.h. of 30-50% is appropriate for most areas. [See NWFA Technical Publication C-300; Regional Climate Variations for additional information.]
- Never install a wood floor over a known moisture condition. Always test for moisture regardless of conditions to identify any hidden issues that may arise.

Acclimation/Conditioning:

- Only after the site conditions are confirmed suitable for wood flooring should the flooring be acclimated to those site conditions.
- Prior to delivery of the wood flooring, test and record the jobsite conditions and the subfloor moisture to ensure they are suitable for wood flooring delivery. Elevated readings must be resolved prior to delivery of any wood flooring.
- Upon delivery of the flooring to the site, again check and record the temperature and relative humidity in the space receiving the wood floor, these readings must be within the manufacturer's requirements.
- Again check and record (photograph) the MC of the (wood) subfloor. Check a minimum of 20 locations for the first 1,000 square feet, and an additional 4 readings per 100 square feet thereafter, and average the results. Write test results directly on the subfloor at each location, including date, and photograph this notation. Test locations should be representative of the entire project and include a minimum of three tests per room receiving wood, with special attention to exterior walls and plumbing. In general, more readings will result in a more-accurate average. [Concrete subfloors, see “Substrates – Concrete”]
- Check and record (photograph) the MC of the flooring from throughout the shipment. Take readings of a minimum of 40 boards for the first 1,000 square feet, and an additional 4 readings per 100 square feet thereafter, and average the results. More readings will result in a more-accurate average.
- Any flooring with unusually high or low moisture readings should be isolated and not installed in the floor.
- The average of the wood subfloor readings should coincide with the manufacturer requirements. Any unusually high or low readings must be addressed prior to wood flooring installation.
- Ensure the MC of the wood subfloor is no more than 4% greater than the MC of solid strip (<3 1/4” widths) flooring, and no more than 2% greater than the MC of solid plank (≥3 1/4” widths) flooring being installed. If moisture testing indicates flooring and subflooring are not sufficiently acclimated, more acclimation is required. Also, note solid wood does not change moisture content and thus dimension uniformly. This may adversely affect the installation.
- Acclimation of solid wood can be facilitated by separating the flooring into small lots and/or completely opening the packaging. Cross stack the materials with spacers (3/4” to 1” stickers) between each layer of flooring to allow air circulation on all sides until equilibrium has been reached.
- Concrete subfloors must be moisture tested, and adequate moisture control systems in place prior to installation of any solid wood floor.

- When the wood flooring is delivered at a MC that coincides with the expected in-use conditions, and coincides with the subfloor moisture conditions as tested, and these conditions will be maintained indefinitely, the flooring may be installed immediately.
- **Record, date, photograph, and document all results – protect your business.**

Moisture Testing Methods [NWFA page 38-44]:

- Understanding how to evaluate jobsite moisture and avoid or resolve any moisture related problems is critical to the success of every hardwood flooring installation.
- Test methods and equipment vary widely. Selection of both varies depending on the type of flooring and subflooring involved in a given job. Regardless, the installer must understand the equipment and test methods required to properly evaluate moisture on every hardwood-flooring job. The single biggest variable – operator error. The installer is responsible to test and record (photos) moisture conditions on every job.

Wood Moisture Testing: There are two basic electronic wood moisture meter types, pinless (dielectric) and pin (electrical resistance). Ideally, an installer should have understand how to use both. Readings from two meters are often helpful and may validate each other or, conversely, help resolve conflicting information.

Concrete Moisture Testing: Slab age does not mean moisture testing can be omitted – moisture testing is critical to assuring the success of every installation. Concrete moisture content must comply with the adhesive manufacturer’s requirements.

The current state of the art in concrete moisture testing is Relative Humidity testing via probes [ASTM F2170] inserted into holes drilled in the concrete. This is by far the most accurate method of determining moisture vapor emission rate. This method requires testing 3 locations for the first 1000 square feet of slab and 1 more for each 1000 square feet thereafter.

Electrical Moisture Meters [ASTM F2659] for concrete are good for preliminary evaluation of concrete slab moisture, but may not provide sufficient conclusive information for a “no/no go” decision. Typically, electrical meter testing requires 8 readings for the first 1000 square feet, and 5 readings for each 1000 square feet thereafter.

Calcium Chloride [ASTM 1869] is another common method of concrete moisture testing which provides a quantifiable moisture vapor emission rate.

Other concrete moisture test methods exist, but are far less common.

Basements and Crawlspace:

- **Basement** conditions will change from season to season and may affect the flooring above. Finished basements are normally maintained similarly with the above living space, but be sure the end user understands how any changes will affect flooring above the basement. Treat any unfinished basement as unconditioned space.
- **Crawlspace:** The distance from the earth to the underside of the floor joists must be a minimum of 18” and a minimum of 12” from the earth to the underside of beams. Crawl space ventilation is critical to avoiding crawl space related moisture issues. The minimum net area of ventilation openings is 1 square foot for each 150 square feet of under-floor space area; unless the ground surface is covered by a Class I vapor retarder material. Where a Class I vapor retarder material is used, the minimum net area of ventilation openings is 1 square foot for each 1,500 square feet of under-floor space area. One such ventilating opening shall be within 3 feet of each corner of the building. **Enclosed and Conditioned Crawlspace:** Crawl spaces may be enclosed and conditioned as detailed in IRC section R408.3, and the entire space is maintained at the same temperature and humidity levels as the above interior living space. These crawl spaces may result in a balanced condition below and above the flooring system. [See NWFA 2019 Installation Guidelines, page 47].

Substrates - Wood [NWFA 48-60]:

- **Wood Subfloors:** Wood flooring is not intended to add structural strength or stiffness to a subfloor; the wood flooring installation is only as good as the subfloor beneath it. The installer/flooring contractor is NOT responsible for the design or installation of the subflooring/structure unless qualified and otherwise contracted. If a subfloor/structure is deemed by the flooring installer/flooring contractor as not suitable, the installer is responsible to notify the builder/owner prior to installation so any deficiencies can be remedied.
- **Plywood subfloor panels** should conform to the most-current U.S. Voluntary Product Standard PS 1 performance standard on the date it was manufactured.
- **Oriented strand board (OSB) subfloor panels** should conform to the governing version U.S. Voluntary PS 2 on the date it was manufactured.
- **Single layer subfloor panels** should be installed continuous over two or more spans, with the long panel dimension (strength axis) perpendicular to floor trusses or joists. All panel edges not supported continuously with framing shall be tongue and groove. To minimize the potential for floor squeaks, all subfloor panels should be glued and nailed or screwed to the floor framing using recommended fasteners and subfloor adhesives conforming to ASTM D3498 or APA Specification AFG-01. The ends of the panels must land at the center of the floor joist/truss, with a minimum bearing of 1/2". Fasten with 6d ring- or screw-shank nails, 8d common nails, or proprietary screws spaced 12" O.C. along panel edges and 12" O.C. along intermediate supports. Leave a 1/8" gap around the perimeter (all four sides) of each panel.

Joist spacing	Minimum Subfloor Required
16" o.c. or less	19/32" plywood or 23/32" OSB
Greater than 16" – 19.2"	23/32" plywood or OSB
Greater than 19.2" – 24"	7/8" plywood or OSB
Greater than 24" – 32"	1-1/8" plywood or OSB

- **Double-Layer Subfloor Systems** should consist of two layers of either plywood or OSB, compliant with the same specs as single layer structural panels. A double layer may be required where the existing/base layer and structure do not meet NWFA minimum guidelines. Both layers must be fully acclimated (see acclimation section), and gapping and fastening requirements remain as for single layer subfloors. The "top" layer should be a minimum 15/32" thickness. A second layer should be oriented perpendicular to the floor framing and offset from the long axis of the base layer by a minimum of 4" and end joints by a minimum of one joist spacing; edges of both layers should never be aligned. This top layer may alternately be installed diagonal to the base layer. No base vs. top seams should align. 1/16" to 1/8" gap must be left around each panel and 3/4" gap at all vertical obstructions. Fastening schedule should be the same as for single layer subfloors. If the existing base layer is particleboard or solid boards, removal is not an option, and the subfloor does not meet NWFA minimum guidelines, the top layer should be a minimum 19/32" thick; otherwise, the same joint stagger and fastening guidelines apply.
- Solid board subfloors should be "1x6" nominal dimension, installed 45 degrees to the joists, and structurally sound. All end joints require full bearing on a joist, fastened with a minimum 8d rosin-coated or ring shank nails or equivalent.
- Particleboard is not suitable for any mechanically fastened or "glue-assisted" nail down Azalea Lane Avondale hardwood flooring installation.

Wood subfloors - conditions required:

- Subfloors must be **structurally sound**. Address any movement, delamination, squeaks/noise, water damage, physical damage, etc. with the homeowner, builder, or other responsible party prior to installation. Protruding or loose fasteners, squeaks/noises, etc. may be resolved by the installer, while some issues are not an installer's responsibility and may not be within a flooring installer's capability. Document any such conditions with notes in the job file including photographs.

- Subfloors must be **flat**. Subfloor flatness is not the same as “level”. Level is typically not necessary, but reasonably flat is very important. For installation with mechanical fasteners at least 1 ½” long, the subfloor must be flat within ¼” in 10’ or 3/16” in 6’. For all other installations (shorter fasteners, glue down), the subfloor must be flat within 1/8” in 6’, or 3/16” in 10’. There are various means of correcting subfloor flatness; for more information see NWFA Installation Guidelines, page 58-59.
- Subfloors must be **dry**. The builder is responsible to control moisture during the building process. The installer must confirm subfloor moisture conditions are suitable before installing any hardwood floor. Any damage due to moisture exposure (swelling, distortion, etc.) prior to flooring installation must be resolved before proceeding with any Azalea Lane Avondale flooring installation.
- Subfloors must be **clean**. Remove any debris present, and address any contamination that may compromise the installation.

SUBSTRATES – Concrete [NWFA Page 61-86]:

- Concrete slabs should be a MINIMUM of 30-45 days old before evaluating the slab for Azalea Lane Avondale flooring. [THIS DOES NOT MEAN ANY SLAB 30 DAYS OLD IS READY FOR FLOORING INSTALLATION]. A concrete slab on grade (poured directly on soil/ground) must have a Class I vapor retarder installed directly below the slab.
- 3000 PSI [tested by ASTM C39] is the minimum required compressive strength for concrete slabs for direct glue-down Azalea Lane Avondale hardwood wood floor installations, or mechanically anchored wood panel subfloors.
- Lightweight concrete is not suitable for direct glue-down of Azalea Lane Avondale solid hardwood flooring.
- Subfloor Toppings may be used to flatten or smooth concrete, but must be compatible with the adhesive chosen and meet 3000 psi, same as the base slab itself. Topping must also be completely dry before Azalea Lane Avondale hardwood flooring installation.
- Concrete subfloors must be structurally sound, free of hollow spots, voids, loose/crumbling residue, or stress cracks. Document slab conditions including photos and notes in the job file.
- The concrete surface over which Azalea Lane Avondale hardwood flooring is being installed (direct glue-down) must be compatible with the adhesive chosen. That includes:
 - Free of any contaminants that may compromise adhesive bond. This includes old adhesive residue, curing compounds, waxes, oils, paint, dust, drywall compound, etc. [OLD RESILIENT FLOORING AND ADHESIVE RESIDUE MAY CONTAIN ASBESTOS – **DO NOT DISTURB ASBESTOS**].
 - pH of concrete may affect adhesive performance; check with the adhesive manufacturer for acceptable pH levels.
 - Surface porosity is critical to the performance of any adhesive; follow adhesive manufacturer recommendations for appropriate CSP ratings.
 - Concrete slabs must be flat within 3/16” in 10’ or 1/8” in 6’.

Wood Subflooring Installed Over Concrete [NWFA Page 76-86]:

- Wood subfloor panels over concrete slabs may be single or double layer.
- Wood subflooring may be mechanically fastened, full spread glue-down, or floated.
- All concrete conditions as previously defined above must be met.

- Wood panels must be properly acclimated and meet the same standards as previously defined under Substrates – Wood. If using pressure treated panels, they must be kiln dried after treatment and fully acclimated to site conditions.
- A Class-I impermeable vapor barrier is strongly recommended.
- Various fastening methods apply

Substrates - Radiant Heat:

AZALEA LANE SOLID HARDWOOD FLOORING IS NOT RECOMMENDED FOR USE OVER ANY IN-FLOOR RADIANT HEAT

SYSTEM Substrates – Existing Flooring [NWFA Page 102-105]:

- Installing hardwood flooring parallel to an existing solid nailed down wood floor will require an overlay of a minimum 11/32" panel subfloor (see double layer subfloors section). Any new subflooring and the old flooring under it must be fully acclimated (see acclimation section).
- New flooring may be installed (nail or glue down) directly over existing wood flooring if installed perpendicular or at least a 45-degree angle to the existing floor.
- Existing Vinyl, Resilient, Cork, Linoleum floors may be installed over if they are well bonded to the subfloor, flat (1/8" in 6'), clean, and no more than two layers thick. Fasteners must penetrate the subfloor by a minimum of 5/8". Any glue down installation requires checking compatibility of the adhesive with the existing flooring.
- Existing Ceramic, Terrazzo, Slate, and Marble may be installed over using glue down methods only. Refer to the concrete subfloors section for more information. Many such substrates will require abrasion to create a good bond for the adhesive.
- Carpet: Never install hardwood flooring over carpet or carpet pad.

Underlayments – Moisture Control [NWFA Page 106-109]:

When installing over a wood subfloor, always identify if the space below the flooring is conditioned (heated/cooled and humidified/dehumidified) or unconditioned space (not directly heated/cooled or humidified/dehumidified).

- No vapor retarder is necessary under the new wood floor when installed over a **conditioned** space maintained at the same temperature and humidity as the living space directly above. No vapor retarder should be installed under the wood floor if a Class I or Class II vapor retarder exists on the underside of the joists.
- A Class II vapor retarder should be used on wood subfloors over **unconditioned** spaces. **IMPORTANT:** Never use a vapor retarder to remedy a known moisture condition, and never install a wood floor over a known moisture condition.
- When installing over a concrete subfloor, a Class I impermeable vapor retarder is always recommended, whether installing the wood flooring directly on the concrete, installing a wood subfloor on the concrete, or installing over existing flooring [existing vinyl, resilient, linoleum, or cork flooring may not require a vapor retarder be installed.]
- Sound Control/Acoustical Underlayments [See NWFA – Page 110 for details]

Layout [NWFA 2019 Installation Guidelines, Page 116-120]:

- Hardwood flooring is typically installed parallel to the length of the room, but always install perpendicular to the floor joists unless special subfloor conditions are met (see installation section). A primary line should be established as the longest, straightest, continuous line on the job, and all other working lines based off the primary line so the job flows well and is visually "balanced" in the space.

INSTALLATION METHODS [NWFA 2019 Installation Guidelines, Page 121-131]:

- Nail Down
 - The solid flooring must be installed perpendicular (45 degree angle or greater) to the floor joists, unless special subfloor requirements are met.
 - When installing parallel to joists it is critical to confirm adequate subfloor thickness. Typically add a second layer of minimum 15/32" plywood underlayment to the existing subfloor (refer

- to double-layer subfloor systems for more detailed information.) Another option is to brace between joists/floor trusses. This should be completed by a qualified professional.
- Fasteners
 - Blind nail using cleats (flooring nails) either 15.5, 16, or 18 gauge, minimum 1 ½" long, or staples 15.5 gauge, ½" crown, minimum 1 ½" long. For plank (3 ¼" +) fasten on 6" – 8" intervals, 1"-3" from each end joint, minimum 2 fasteners per board. For strip (2 ¼") fasten on 8" – 10" intervals, 1"-3" from each end joint, minimum 2 fasteners per board. Blind fasteners should be seated flush in the nail pocket, not too deep.
 - For face nailing (near walls and obstacles to blind nailing), use casing or finish nails, minimum 18 gauge. For plank floors face nail on 8" to 10" intervals; for strip flooring face nail on 10"-12" intervals. Fill face nail holes with matching wood filler.
 - Elastomeric adhesive may be used as an alternative or addition to the use of face nails where required [see "glue assist" section for more details].
 - Fastening at intervals less than required are acceptable as long as the tongue and core of the flooring is not compromised or split by the fasteners.
 - Remove existing base/shoe, thresholds, etc. Undercut doorjamb and casings.
 - Maintain ¾" expansion space at all vertical obstructions. If the floor span (perpendicular to grain) is greater than 20', field expansion space may be required [see NWFA guidelines page 128 for further information].
 - Install a vapor retarder/underlayment as necessary.
 - Racking prior to installation, work from multiple bundles or cartons to achieve satisfactory assortment of color variation, lengths, etc. Distribute lengths to avoid patterns such as stair-steps or H- joints. Cutting varied starter board lengths will assist in "randomizing" joints. In general, end-joint stagger from row-to-row should be a minimum of twice the width of the flooring (6" stagger for 3" wide material). Wider-width materials may be more difficult to stagger joints due to product length limitations. Fasten a starter row along the entire length of the primary working line. Installed wood flooring should not deviate from a straight line more than 3/16" in 10'. Use spline (aka "slip-tongue) anytime the flooring direction changes, at all headers or flush transitions, and when reversing installation direction such as starting in the center of a layout or back filling.
 - Glue Assisted Nail Down [fasteners AND adhesive combined]
 - The manufacturer recommends this method when installing all products 5" and wider.
 - **A traditional sheet-good vapor retarder must be omitted. However, proper and stable site moisture conditions remain important. Glue assisted nail down installations remain subject to moisture issues.**
 - Where wood flooring is being installed over unconditioned space, use of a liquid-applied or similar Class II vapor retarder compatible with the flooring adhesive may be used in a glue-assist directly to the subfloor.
 - The nailing schedule should remain the same as normal installation for the flooring being installed. The addition of adhesive is not intended as a replacement fastener mechanism, rather supplemental to the mechanical fastener.
 - The wood flooring adhesive used should be elastomeric to allow for normal movement of the flooring system. The adhesive must be compatible with the subflooring and any liquid-applied or similar vapor retarder system used.
 - Adhesive may be applied to the subfloor or back of the board to supplement the mechanical fasteners. Adhesive should cover the entire width and length of each plank, to within a minimum of 1" from the edges and ends of each board. Serpentine and striped patterns are acceptable.
 - Full Spread Glue Down [wood or concrete subfloors]:
 - The solid flooring must be installed perpendicular (45 degree angle or greater) to the floor joists, unless special subfloor requirements are met.
 - When installing parallel to joists it is critical to confirm adequate subfloor thickness. Typically add a second layer of minimum 15/32" plywood underlayment to the existing subfloor (refer to double-layer subfloor systems for more detailed information.) Another option is to brace between joists/floor trusses. This should be completed by a qualified professional.
 - Concrete subfloors (refer to the Concrete Subfloors chapter for more-detailed information).

- **A traditional sheet-good vapor retarder must be omitted [except acoustical underlayment systems]. However, proper and stable site moisture conditions remain important. Glue down installations remain subject to moisture issues.**
- Where wood flooring is being installed over unconditioned space, use of a liquid-applied or similar Class II vapor retarder compatible with the flooring adhesive may be used in a glue-down installation.
- The manufacturer recommends a quality hardwood-flooring adhesive. Follow the adhesive manufacturer's instructions for proper use of the adhesive, application methods, flash-time, working-time, etc. All wood flooring adhesives must be elastomeric and remain flexible despite movement in the installed flooring system.
- Expansion space, racking, joint spacing, etc. remain the same as recommended for nail down installations.

Protection, Care, and Maintenance [NWFA page 150-152]

- After installation, if a protective cover over the floor is needed, cover the floor completely. Areas left uncovered may change color. Also, note covering a glue-down or glue-assisted application may not allow some adhesives to properly cure; follow the adhesive manufacturers' recommendations. Any adverse effects of covering any Azalea Lane floor after installation are excluded by the manufacturer's limited warranty.
Any protective covering should be taped, using a low-adhesion tape, to base or shoe moldings. NEVER tape to the finished flooring. When taping paper or sheets together, tape them to each other, not to the floor. Do not allow the floor covering to sit on the installed floor for an extended period of time.